

Amendments to the Claims:

The following listing of Claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently amended) A structure in a phase changeable memory cell, comprising:

a bottom electrode having an interlayer dielectric layer thereon, the bottom electrode having a recess therein that extends beyond a boundary between the bottom electrode and the interlayer dielectric; and

a phase changeable layer in the recess including a protruding portion of the phase changeable layer that protrudes into the bottom electrode beyond the boundary, wherein the recess extends beyond the boundary to define a side wall of the recess that contacts the protruding portion of the phase changeable layer and wherein the phase changeable layer contacts the bottom electrode within confines of the recess.

2. (Original) A structure according to Claim 1 wherein the recess extends beyond the boundary by a depth to define a side wall of the recess that contacts the protruding portion of the phase changeable layer, wherein the depth is defined to limit an amount of heat transmission from the bottom electrode to the phase changeable layer across the side wall to less than an amount sufficient to cause the phase changeable layer to change phase between a crystalline state and an amorphous state.

3. (Original) A structure according to Claim 1 wherein the interlayer dielectric layer includes a contact hole with the phase changeable layer therein on the recess.

4. (Currently amended) A structure in a phase changeable memory cell, comprising:

a planar bottom electrode having an interlayer dielectric layer thereon, the planar bottom electrode having a recess therein that extends beyond a boundary between the planar bottom electrode and the interlayer dielectric wherein the interlayer dielectric layer includes a contact hole with the phase changeable layer therein on the recess; and

a phase changeable layer in the recess including a protruding portion of the phase changeable layer that protrudes into the planar bottom electrode beyond the boundary wherein the contact hole has an inward tapered profile extending toward the planar bottom electrode that defines an opening that is narrower at [[in]] a bottom of the recess than away from the recess.

5. (Currently amended) A phase changeable memory cell, comprising:

bottom electrodes disposed over the semiconductor substrate;

a interlayer dielectric layer formed over the semiconductor substrate having the bottom electrodes; and

a plurality of data storage elements extended through the interlayer dielectric layer to connect with the bottom electrodes, respectively,

wherein, each data storage elements is extended into the bottom electrode to predetermined depth so that a portion of the sidewall of the data storage element extends into the bottom electrode; and

a lower interlayer dielectric layer disposed over the semiconductor substrate, wherein the bottom electrode is extended through the lower interlayer dielectric layer to contact with directly the semiconductor substrate.

6. (Previously presented) A phase changeable memory cell, comprising:

planar bottom electrodes disposed over the semiconductor substrate;

a interlayer dielectric layer formed over the semiconductor substrate having the planar bottom electrodes; and

a plurality of data storage elements extended through the interlayer dielectric

layer to connect with the bottom electrodes, respectively,

wherein, each data storage elements is extended into the bottom electrode to predetermined depth so that a portion of the sidewall of the data storage element contacts the bottom electrode;

a lower interlayer dielectric layer disposed over the semiconductor substrate;
and

storage node plugs extended through the lower interlayer dielectric layer to connect with predetermined region of the semiconductor substrate,

wherein the bottom electrode is formed on the storage node plug to connect with the storage node plug.

7. (Canceled).

8. (Original) The phase changeable memory cell of claim 5,
the bottom electrode is formed of one selected form group comprising titanium nitride (TiN), titanium aluminum nitride (TiAlN), titanium silicon nitride (TiSiN), tantalum aluminum nitride (TaAlN) and tantalum silicon nitride (TaSiN).

9. (Original) The phase changeable memory cell of claim 5, the data storage element comprising:

a phase changeable pattern electrically connected with the bottom electrode;
and

an upper electrode formed on the phase changeable pattern.

10. (Original) The phase changeable memory cell of claim 9,
the upper electrode is formed of one selected form group comprising titanium nitride (TiN), titanium aluminum nitride (TiAlN), titanium silicon nitride (TiSiN), tantalum aluminum nitride (TaAlN) and tantalum silicon nitride (TaSiN).

Claims 11-23 (Canceled).

24. (Currently amended) A structure in a phase changeable memory cell, comprising:

a bottom electrode having an interlayer dielectric layer thereon; and

a phase changeable layer extending through the interlayer dielectric layer and protruding into a recess in the bottom electrode wherein the phase changeable layer contacts the bottom electrode with confines of the recess, wherein the bottom electrode defines a sidewall of the recess that contacts the protruding portion of the phase changeable layer, and a depth of the recess extending beyond the boundary is less than a thickness of a portion of the phase changeable layer subject to a phase change during heating of the phase changeable layer.

25. (New) A structure according to Claim 1 wherein a depth of the recess extending beyond the boundary is less than a thickness of a portion of the phase changeable layer subject to a phase change during heating of the phase changeable layer.